**THESIS\_VITALIOT**

The main objective of the study is to create a portable device for remote patient monitoring using Internet of Things with specific objectives such as:

* To develop a device that incorporates the location with the measurement of vital signs such as body temperature, blood pressure, pulse rate, respiration rate, and ECG into the internet of things for remote monitoring.
* To create a cloud system that will store and send data acquired by the sensors along with the location via GPS to the hospital for the medical staff to view.
* To establish a two-way communication by allowing the patient to ask for real-time assessment and instructions based on analysis.
* To test and evaluate the system whether the results are consistent and accurate based on controlled tests and manual checking.



**Raspberry Pi Part**

Sensors Used

|  |  |
| --- | --- |
| **Name** | **Target Data** |
| Maxim MAX30205 | Body Temperature |
| ADS1292R Breakout Board | ECG and Respiration Rate |
| Pulse Sensor Amped | Pulse Rate and Blood Pressure Sensor |
| Mini-keyboard | Entering symptoms. |
| SIM808 (GSM/GPS), Microphone and Speaker | Two-way voice call from device to medical personnel’s phone. Latitude and Longitude |

Changes Made from the Paper

Maxim MAX30205 Breakout Board and ADS1292R Breakout Board needs a separate Atmel based microcontroller to work and cannot be connected directly to the Raspberry Pi since there is no software implementation of the said sensors readily for the Raspberry Pi. Therefore, I proposed it to be connected to Arduino Nano separately. It needs to be separated because the timing of sensor readings will be affected.

A Raspberry Pi HAT for those sensors is available which allows it to be connected to the Raspberry Pi directly. But since you are using a breakout board rather than a HAT, you need a separate microcontroller.

So, the connection will be changed to:

* Maxim MAX30205 and Pulse Sensor Amped will be connected to Arduino Nano 1
* ADS1292R Breakout Board will be connected to Arduino Nano 2
* Arduino Nano 1 and Arduino Nano 2 will be connected to the Raspberry Pi via USB cable.
* The keyboard will also be connected to the USB cable of the Raspberry Pi.
* The SIM808 will be connected to Raspberry Pi’s hardware UART (TX, RX).

Basically, all the sensors are connected to the microcontroller which are the two Arduinos. The job of the Raspberry Pi will be to receive the sensor readings from the two microcontrollers, the GPS data and the keyboard then all data will be displayed through the LCD and send it to the cloud storage. We will use MongoDB for that or we might change it if needed.

The user of the device should be registered to be able to use the cloud services. There is also a guest mode which is just offline. The user can only register by creating an account online using the web application.

The speaker and microphone that will be used in the SIM808 is to be followed.

**Web Application Part**

* There are only two kinds of person who will use the web application, the user (patient) and the admin (medical personnel).
* The user can register through the web application and can view the history of vital signs data only.
* The user cannot edit or delete any vital signs record.
* The user can only edit personal data such as name, address, password etc.
* Only the registered users can use the device for cloud communication.
* There is only one main admin for the web application.
* The admin can view all personal data and vital signs data of all the registered user in the web application.
* The admin can also delete vital signs history of each user.
* The admin can change its username and password.
* The vital signs data are in tabular format.

**Data to be Recorded in the Cloud**

User’s Personal Data

* Username
* Password
* First name
* Middle Name
* Last name
* Age
* Gender
* Address

User’s Vital Signs Data

* Username (To distinguish data from other users)
* Body Temperature Data
* Pulse Data
* Blood Pressure Data
* Respiratory Data
* ECG Data

Admin Data

* Username
* Password

**Tasks**

Our job is to:

* Create the circuit of the device.
* Create the program of the device.
* Create the web application.
* Create the cloud storage.
* Provide connection between the device and the web application.

You job will be to:

* Create the PCB of the project.
* Create the casing of the project.
* Testing of the device.